**Analysis of Search Algorithms**

**Algorithms Implemented:**

Linear Search (search by product name)

Binary Search (search by product ID)

**Data Structures Used:**

Array of Product objects

Array was unsorted for Linear Search, sorted for Binary Search

**Time Complexity Comparison:**

Algorithm Best Case Average Case Worst Case Sorted Required

Linear Search O(1) O(n) O(n) ❌ No

Binary Search O(1) O(log n) O(log n) ✅ Yes

**Search Examples:**

Input "Shoes" in Linear Search → Found in 2nd position

Input 104 in Binary Search → Found quickly with few comparisons

**Suitability Analysis:**

**Linear Search:**

Easy to implement

Useful when data is small or unsorted

Slower for large data

**Binary Search:**

Much faster on large datasets

Requires pre-sorting (adds cost)

Ideal for performance-critical applications

**Final Conclusion:**

For an e-commerce platform where performance matters and product data can be sorted by ID, Binary Search is the preferred approach.

However, Linear Search is more flexible when searching by names or other non-sortable fields.